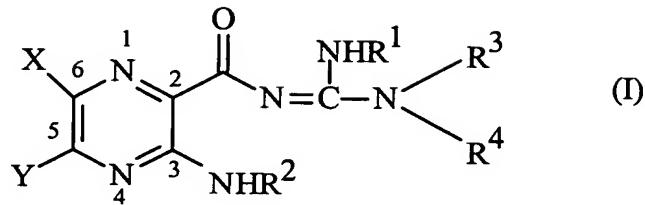


CLAIMS:

1. A compound represented by formula (I):



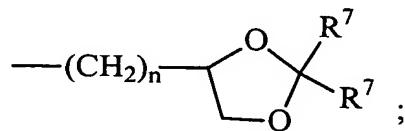
wherein

X is hydrogen, halogen, trifluoromethyl, lower alkyl, unsubstituted or substituted phenyl, lower alkyl-thio, phenyl-lower alkyl-thio, lower alkyl-sulfonyl, or phenyl-lower alkyl-sulfonyl;

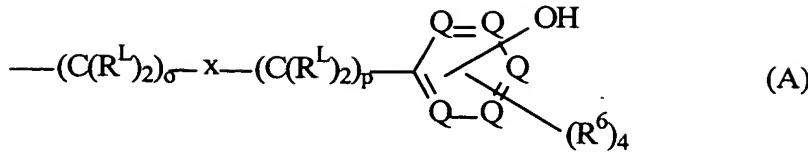
Y is hydrogen, hydroxyl, mercapto, lower alkoxy, lower alkyl-thio, halogen, lower alkyl, unsubstituted or substituted mononuclear aryl, or -N(R²)₂;

R¹ is hydrogen or lower alkyl;

each R² is, independently, -R⁷, -(CH₂)_m-OR⁸, -(CH₂)_m-NR⁷R¹⁰, -(CH₂)_n(CHOR⁸)(CHOR⁸)_n-CH₂OR⁸, -(CH₂CH₂O)_m-R⁸, -(CH₂CH₂O)_m-CH₂CH₂NR⁷R¹⁰, -(CH₂)_n-C(=O)NR⁷R¹⁰, -(CH₂)_n-Z_g-R⁷, -(CH₂)_m-NR¹⁰-CH₂(CHOR⁸)(CHOR⁸)_n-CH₂OR⁸, -(CH₂)_n-CO₂R⁷, or

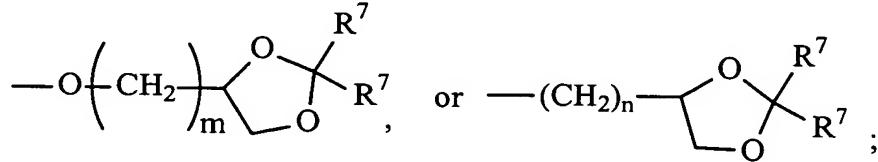


R³ and R⁴ are each, independently, hydrogen, a group represented by formula (A), lower alkyl, hydroxy lower alkyl, phenyl, phenyl-lower alkyl, (halophenyl)-lower alkyl, lower-(alkylphenylalkyl), lower alkoxyphenyl)-lower alkyl, naphthyl-lower alkyl, or pyridyl-lower alkyl, with the proviso that at least one of R³ and R⁴ is a group represented by formula (A):



wherein

- each R^L is, independently, $-R^7$, $-(CH_2)_n-OR^8$, $-O-(CH_2)_m-OR^8$,
- $-(CH_2)_n-NR^7R^{10}$, $-O-(CH_2)_m-NR^7R^{10}$, $-(CH_2)_n(CHOR^8)(CHOR^8)_n-CH_2OR^8$,
- $-O-(CH_2)_m(CHOR^8)(CHOR^8)_n-CH_2OR^8$, $-(CH_2CH_2O)_m-R^8$,
- $-O-(CH_2CH_2O)_m-R^8$, $-(CH_2CH_2O)_m-CH_2CH_2NR^7R^{10}$,
- $-O-(CH_2CH_2O)_m-CH_2CH_2NR^7R^{10}$, $-(CH_2)_n-C(=O)NR^7R^{10}$,
- $-O-(CH_2)_m-C(=O)NR^7R^{10}$, $-(CH_2)_n-(Z)_g-R^7$, $-O-(CH_2)_m-(Z)_g-R^7$,
- $-(CH_2)_n-NR^{10}-CH_2(CHOR^8)(CHOR^8)_n-CH_2OR^8$,
- $-O-(CH_2)_m-NR^{10}-CH_2(CHOR^8)(CHOR^8)_n-CH_2OR^8$,
- $-(CH_2)_n-CO_2R^7$, $-O-(CH_2)_m-CO_2R^7$, $-OSO_3H$, $-O$ -glucuronide, $-O$ -glucose, or



each x is, independently, O , NR^7 , $C=O$, $CHOH$, $C=N-R^6$, or represents a single bond;

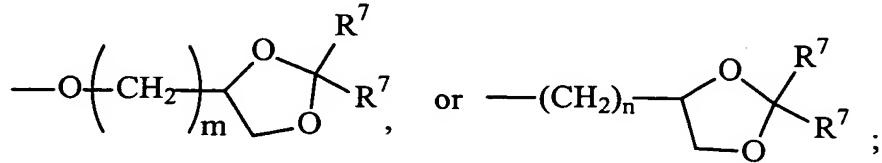
each o is, independently, an integer from 0 to 10;

each p is, independently, an integer from 0 to 10;

with the proviso that (a) the sum of o and p in each contiguous chain is from 1 to 10 when x is O , NR^7 , $C=O$, or $C=N-R^6$ or (b) that the sum of o and p in each contiguous chain is from 4 to 10 when x represents a single bond;

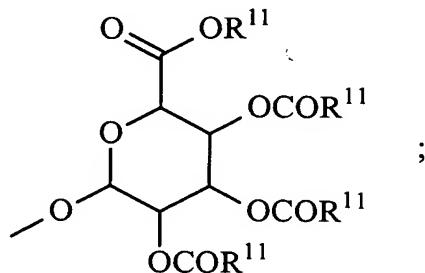
- each R^6 is, independently, $-R^7$, $-OH$, $-OR^{11}$, $-N(R^7)_2$, $-(CH_2)_m-OR^8$,
- $-O-(CH_2)_m-OR^8$, $-(CH_2)_n-NR^7R^{10}$, $-O-(CH_2)_m-NR^7R^{10}$,
- $-(CH_2)_n(CHOR^8)(CHOR^8)_n-CH_2OR^8$, $-O-(CH_2)_m(CHOR^8)(CHOR^8)_n-CH_2OR^8$,
- $-(CH_2CH_2O)_m-R^8$, $-O-(CH_2CH_2O)_m-R^8$, $-(CH_2CH_2O)_m-CH_2CH_2NR^7R^{10}$,
- $-O-(CH_2CH_2O)_m-CH_2CH_2NR^7R^{10}$, $-(CH_2)_n-C(=O)NR^7R^{10}$,

$-\text{O}-(\text{CH}_2)_m-\text{C}(=\text{O})\text{NR}^7\text{R}^{10}$, $-(\text{CH}_2)_n-(\text{Z})_g-\text{R}^7$, $-\text{O}-(\text{CH}_2)_m-(\text{Z})_g-\text{R}^7$,
 $-(\text{CH}_2)_n-\text{NR}^{10}-\text{CH}_2(\text{CHOR}^8)(\text{CHOR}^8)_n-\text{CH}_2\text{OR}^8$,
 $-\text{O}-(\text{CH}_2)_m-\text{NR}^{10}-\text{CH}_2(\text{CHOR}^8)(\text{CHOR}^8)_n-\text{CH}_2\text{OR}^8$,
 $-(\text{CH}_2)_n-\text{CO}_2\text{R}^7$, $-\text{O}-(\text{CH}_2)_m-\text{CO}_2\text{R}^7$, $-\text{OSO}_3\text{H}$, $-\text{O}\text{-glucuronide}$, $-\text{O}\text{-glucose}$,



5 wherein when two R^6 are $-\text{OR}^{11}$ and are located adjacent to each other on a phenyl ring, the alkyl moieties of the two R^6 may be bonded together to form a methylenedioxy group;

10 each R^7 is, independently, hydrogen or lower alkyl;
each R^8 is, independently, hydrogen, lower alkyl, $-\text{C}(=\text{O})-\text{R}^{11}$, glucuronide, 2-tetrahydropyranyl, or



each R^9 is, independently, $-\text{CO}_2\text{R}^7$, $-\text{CON}(\text{R}^7)_2$, $-\text{SO}_2\text{CH}_3$, or $-\text{C}(=\text{O})\text{R}^7$;

each R^{10} is, independently, -H, $-\text{SO}_2\text{CH}_3$, $-\text{CO}_2\text{R}^7$, $-\text{C}(=\text{O})\text{NR}^7\text{R}^9$, $-\text{C}(=\text{O})\text{R}^7$, or $-\text{CH}_2-(\text{CHOH})_n-\text{CH}_2\text{OH}$;

15 each Z is, independently, CHOH , $\text{C}(=\text{O})$, $\text{CHNR}^7\text{R}^{10}$, $\text{C}=\text{NR}^{10}$, or NR^{10} ;

each R^{11} is, independently, lower alkyl;

each g is, independently, an integer from 1 to 6;

each m is, independently, an integer from 1 to 7;

each n is, independently, an integer from 0 to 7;

20 each Q is, independently, $\text{C}-\text{R}^5$, $\text{C}-\text{R}^6$, or a nitrogen atom, wherein at most three Q in a ring are nitrogen atoms;

or a pharmaceutically acceptable salt thereof, and
inclusive of all enantiomers, diastereomers, and racemic mixtures thereof.

2. The compound of Claim 1, wherein Y is -NH₂.
- 5 3. The compound of Claim 2, wherein R² is hydrogen.
4. The compound of Claim 3, wherein R¹ is hydrogen.
5. The compound of Claim 4, wherein X is chlorine.
6. The compound of Claim 5, wherein R³ is hydrogen.
7. The compound of Claim 6, wherein each R^L is hydrogen.
- 10 8. The compound of Claim 7, wherein o is 4.
9. The compound of Claim 8, wherein p is 0.
10. The compound of Claim 9, wherein x represents a single bond.
11. The compound of Claim 10, wherein each R⁶ is hydrogen.
12. The compound of Claim 11, wherein at most one Q is a nitrogen atom.
- 15 13. The compound of Claim 12, wherein no Q is a nitrogen atom.
14. The compound of Claim 1, wherein
X is halogen;
Y is -N(R⁷)₂;
- 19 R¹ is hydrogen or C₁-C₃ alkyl; and
R² is -R⁷, -(CH₂)_m-OR⁷, or -(CH₂)_n-CO₂R⁷;

R^3 is a group represented by formula (A); and

R^4 is hydrogen, a group represented by formula (A), or lower alkyl;

15. The compound of Claim 14, wherein

X is chloro or bromo;

5 Y is $-N(R^7)_2$;

R^2 is hydrogen or C_1-C_3 alkyl;

at most three R^6 are other than hydrogen as defined above;

at most three R^L are other than hydrogen as defined above; and

at most 2 Q are nitrogen atoms.

10 16. The compound of Claim 15, wherein Y is $-NH_2$.

17. The compound of Claim 16, wherein

R^4 is hydrogen;

at most one R^L is other than hydrogen as defined above;

at most two R^6 are other than hydrogen as defined above; and

15 at most 1 Q is a nitrogen atom.

18. The compound of Claim 17, wherein x is O, NR^7 , C=O, CHOH, or C=N- R^6 .

19. The compound of Claim 17, wherein x represents a single bond.

20. The compound of Claim 1, wherein x is O, NR^7 , C=O, CHOH, or C=N- R^6 .

21. The compound of Claim 1, wherein x represents a single bond.

20 22. The compound of Claim 1, wherein each R^6 is hydrogen.

23. The compound of Claim 1, wherein at most two R^6 are other than hydrogen as defined in Claim 1.

24. The compound of Claim 1, wherein one R⁶ is other than hydrogen as defined in
Claim 1.

25. The compound of Claim 1, wherein one R⁶ is -OH.

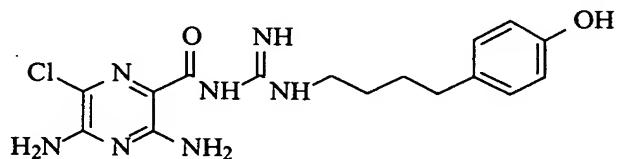
26. The compound of Claim 1, wherein each R^L is hydrogen.

5 27. The compound of Claim 1, wherein at most two R^L are other than hydrogen as
defined in Claim 1.

28. The compound of Claim 1, wherein one R^L is other than hydrogen as defined in
Claim 1.

10 29. The compound of Claim 1, wherein x represents a single bond and the sum of o
and p is 4 to 6.

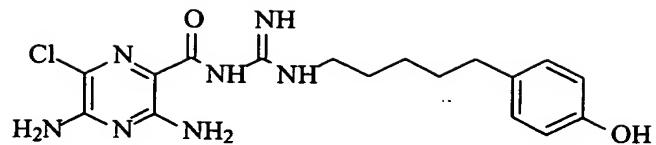
30. The compound of Claim 1, which is represented by the formula



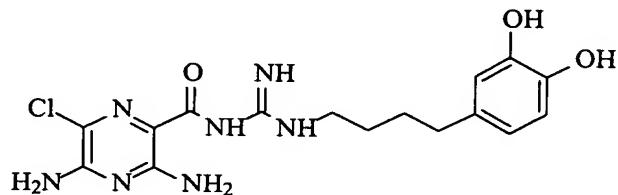
31. The compound of Claim 30, which is in the form of a pharmaceutically acceptable
salt.

32. The compound of Claim 31, which is in the form of a hydrochloride salt.

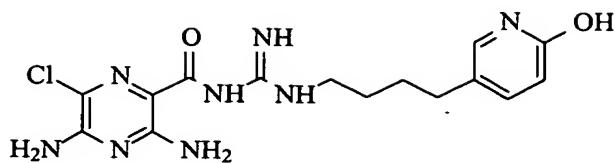
15 33. The compound of Claim 1, which is represented by the formula



34. The compound of Claim 33, which is in the form of a pharmaceutically acceptable salt.
35. The compound of Claim 34, which is in the form of a hydrochloride salt.
36. The compound of Claim 1, which is represented by the formula



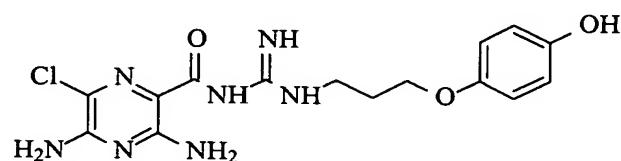
- 5 37. The compound of Claim 36, which is in the form of a pharmaceutically acceptable salt.
38. The compound of Claim 37, which is in the form of a hydrochloride salt.
39. The compound of Claim 1, which is represented by the formula



40. The compound of Claim 39, which is in the form of a pharmaceutically acceptable salt.

41. The compound of Claim 40, which is in the form of a hydrochloride salt.

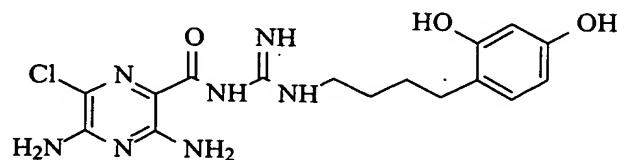
42. The compound of Claim 1, which is represented by the formula



5 43. The compound of Claim 42, which is in the form of a pharmaceutically acceptable salt.

44. The compound of Claim 43, which is in the form of a hydrochloride salt.

45. The compound of Claim 1, which is represented by the formula



46. The compound of Claim 45, which is in the form of a pharmaceutically acceptable salt.

47. The compound of Claim 46, which is in the form of a hydrochloride salt.

48. The compound of Claim 1, which is in the form of a pharmaceutically acceptable
5 salt.

49. A pharmaceutical composition, comprising the compound of Claim 1 and a pharmaceutically acceptable carrier.

50. A method of promoting hydration of mucosal surfaces, comprising:
administering an effective amount of the compound of Claim 1 to a mucosal surface of
10 a subject.

51. A method of restoring mucosal defense, comprising:
topically administering an effective amount of the compound of Claim 1 to a mucosal surface of a subject in need thereof.

52. A method of blocking sodium channels, comprising:
15 contacting sodium channels with an effective amount of the compound of Claim 1.

53. A method of treating chronic bronchitis, comprising:
administering an effective amount of the compound of Claim 1 to a subject in need
thereof.

54. A method of treating cystic fibrosis, comprising:
20 administering an effective amount of the compound of Claim 1 to a subject in need
thereof.

55. A method of treating sinusitis, comprising:
administering an effective amount of the compound of Claim 1 to a subject in need thereof.

5 56. A method of treating vaginal dryness, comprising:
administering an effective amount of the compound of Claim 1 to the vaginal tract of a subject in need thereof.

10 57. A method of treating dry eye, comprising:
administering an effective amount of the compound of Claim 1 to the eye of a subject in need thereof.

58. A method of promoting ocular hydration, comprising:
administering an effective amount of the compound of Claim 1 to the eye of a subject.

59. A method of promoting corneal hydration, comprising:
administering an effective amount of the compound of Claim 1 to the eye of a subject.

15 60. A method of promoting mucus clearance in mucosal surfaces, comprising:
administering an effective amount of the compound of Claim 1 to a mucosal surface of a subject.

61. A method of treating Sjogren's disease, comprising:
administering an effective amount of the compound of Claim 1 to a subject in need thereof.

20 62. A method of treating distal intestinal obstruction syndrome, comprising:
administering an effective amount of the compound of Claim 1 to a subject in need thereof.

63. A method of treating dry skin, comprising:
administering an effective amount of the compound of Claim 1 to the skin of a subject
in need thereof.
- 5 64. A method of treating esophagitis, comprising:
administering an effective amount of the compound of Claim 1 to a subject in need
thereof.
- 10 65. A method of treating dry mouth (xerostomia), comprising:
administering an effective amount of the compound of Claim 1 to the mouth of a
subject in need thereof.
- 15 66. A method of treating nasal dehydration, comprising:
administering an effective amount of the compound of Claim 1 to the nasal passages
of a subject in need thereof.
67. The method of Claim 66, wherein the nasal dehydration is brought on by
administering dry oxygen to the subject.
- 15 68. A method of preventing ventilator-induced pneumonia , comprising:
administering an effective amount of the compound of Claim 1 to a subject on a
ventilator.
- 20 69. A method of treating asthma, comprising:
administering an effective amount of the compound of Claim 1 to a subject in need
thereof.
70. A method of treating primary ciliary dyskinesia, comprising:
administering an effective amount of the compound of Claim 1 to a subject in need
thereof.

71. A method of treating otitis media, comprising:
administering an effective amount of the compound of Claim 1 to a subject in need thereof.
- 5 72. A method of inducing sputum for diagnostic purposes, comprising:
administering an effective amount of the compound of Claim 1 to a subject in need thereof.
- 10 73. A method of treating chronic obstructive pulmonary disease, comprising:
administering an effective amount of the compound of Claim 1 to a subject in need thereof.
- 15 74. A method of treating emphysema, comprising:
administering an effective amount of the compound of Claim 1 to a subject in need thereof.
- 20 75. A method of treating pneumonia, comprising:
administering an effective amount of the compound of Claim 1 to a subject in need thereof.
- 25 76. A method of treating constipation, comprising:
administering an effective amount of the compound of Claim 1 to a subject in need thereof.
- 30 77. The method of Claim 76, wherein the compound is administered orally or via a suppository or enema.
- 35 78. A method of treating chronic diverticulitis, comprising:
administering an effective amount of the compound of Claim 1 to a subject in need thereof.

79. The present invention also provides a method of treating rhinosinusitis, comprising:

administering an effective amount of the compound of Claim 1 to a subject in need thereof.

5 80. A composition, comprising:
the compound of Claim 1; and
a P2Y2 inhibitor.

10 81. A composition, comprising:
the compound of Claim 1; and
a bronchodilator.